

FLAME RETARDANT UREA-BIO BASED URETHANE COMPOSITIONS

This patent application is a continuation-in-part of patent application No. 09/941,402 filed 08/30/01, which is a continuation-in-part of 09/532,646 filed 03/22/2000, which is a continuation-in-part of 08/801,776 filed 02/14/97, now Patent No. 5,788,915, which is a continuation-in-part of 08/723,779 filed 09/30/96 now Patent No. 5,854,309 and a division of 09/149,847 filed 09/08/98 now Patent No. 6,258,298.

FIELD

The invention concerns urea compounds and bio based compounds reacted with polyisocyanates to produce flame retarded urethane products. The invention also concerns their preparation and use. The urea compounds with bio based compounds reacted with polyisocyanates are useful to produce flame retardant urethane plastics. The urea compounds and may be reacted with phosphorus and/or boron containing compounds to produce other flame retardant compounds. The urea compounds may also be reacted with aldehydes to produce amino condensation-aldehyde resins for use with bio based compounds a flame retardant urethanes.

BACKGROUND

The urea and urea compounds produced by heating of urea to produce urea condensation compounds, such as a mixture of urea, biuret, cyanuric acid and cyamelide, is known in the arts, but the use of these compounds with bio based compounds as a flame retardant is novel. The urea condensation compounds and their phosphorus and/or boron salts are used as flame retardant compounds in plastics and natural products. Urea and melamine were utilized as a flame retardant compound by Fracalossi, et al., in U.S. Patent No. 4,385,131. Melamine was utilized as flame retardant compounds in polyurethanes by Yukuta, et al., in U. S.

IN THE CLAIMS

1. (Cancel) A flame retardant polyurethane composition produced by the process comprising of mixing and reacting the following components:

Component B consisting of

- (A). urea and/or urea condensates, in the amount of 50 to 200 parts by weight;
- (B). bio based compound selected from the group consisting of vegetable oils, molasses, corn syrup, sugar, lignin, sodium cellulose, hemi-cellulose and mixtures thereof in the amount of 50 to 200 parts by weight;
- (C) Water, in the amount of 0 to 200 parts by weight;
- (D) blowing agent, in the amount of 0 to 50 parts by weight;
- (E) urethane catalyst, in the amount of 0 to 20 parts by weight;
- (F) carbonization auxiliaries, in the amount of 0 to 50 parts by weight;
- (G) filler , non-reactive, in the amount of 0 to 200 parts by weight based on weight;
- (H) surfactant, 0 to 20 parts by weight;
- (I) compound with an active hydrogen that will react with a polyisocyanate, in the amount of 0 to 100 parts by weight;

Component A consisting of:

- (J) polyisocyanate, in the amount of 50 to 400 parts by weight;

Component A and Component B are mixed and reacted.

2. (Currently amended) The flame retardant composition of Claim ~~1~~ 9 wherein the blowing agent is selected from the group consisting of methyl isobutyl ketone, acetone, mechanically frothed gas, methylene chloride and mixtures thereof.
3. (Currently amended) The flame retardant composition of Claim ~~1~~ 9 wherein the compound with an active hydrogen is a polyol.

4. (Currently amended) The flame retardant composition of Claim ~~4~~ 9 wherein the urethane catalyst is an amine and/or an organic metal catalyst.
5. (Currently amended) The flame retardant composition of Claim ~~4~~ 9 wherein the surfactant is a silicone surfactant.
6. (Currently amended)The flame retardant composition of Claim ~~4~~ 9 wherein the carbonization auxiliaries are selected from the group consisting of phosphorus containing compounds, boron containing compounds, boron-phosphate containing compounds and sulfur containing compounds that produce acidic components in the pyrolysis mixture.
7. (Cancel) The flame retardant composition of Claim 1 wherein the filler is selected from the group consisting of urea, melamine, dicyandiamide, melamine cyanurate , amino phosphates, aminopolyphosphates, aminoplasts, phenoplasts, powdered synthetic resins, sawdust, carbohydrates, bituminous additives, graphite, graphite compounds, cyanuric derivatives or their formaldehyde resins, powdered coke, silica, fiberglass, alkali metal silicates, alkaline earth metal silicates, metals, metal silicates, oxides, carbonates, sulphates, phosphates and borates, glass beads, hollow glass beads, hydrated aluminum oxide and mixtures thereof.
8. (Currently amended) A flame retardant polyurethane composition produced by the process comprising of mixing and reacting the following components:

Component B consisting of

(A) urea and/or urea condensate, in the amount of 50 to 200 parts by weight;

(B) bio based compound consisting of vegetable oil and is chosen from the group consisting of soy oil, rapeseed oil, palm oil, cotton seed oil, corn oil, safflower oil, flaxseed oil and mixture thereof, in the amount of 50 to 200 parts by weight.

(C) Water, in the amount of 0 to 200 parts by weight;

- (D) blowing agent, in the amount of 0 to 50 parts by weight;
- (E) urethane catalyst, in the amount of 0 to 20 parts by weight;
- (F) carbonization auxiliaries, in the amount of 0 to 50 parts by weight;
- (G) surfactant, 0 to 20 parts by weight;
- (H) compound with an active hydrogen that will react with a polyisocyanate, in the amount of 0 to 100 parts by weight;

Component A consisting of:

- (I) polyisocyanate, selected from the group consisting ~~TDI, MDI, PMDI~~ 4,4
diphenylmethane diisocyanate, 2,4 diphenylmethane diisocyanate and mixtures thereof in the amount of 50 to 400 parts by weight;

Component A and Component B are mixed and reacted.

9. (Currently amended) ~~—The flame retardant urethane composition of Claim 1 wherein the bio based compound is soy oil.~~

A flame retardant polyurethane composition produced by the process comprising of mixing and reacting the following components:

Component B consisting of

- (A) urea and/or urea condensates, in the amount of 50 to 200 parts by weight;
- (B) bio based compound selected from the group consisting of vegetable oils, molasses, corn syrup, sugar, lignin, sodium cellulose, hemi-cellulose and mixtures thereof in the amount of 50 to 200 parts by weight;
- (C) Water, in the amount of 0 to 200 parts by weight;
- (D) blowing agent, in the amount of 0 to 50 parts by weight;
- (E) urethane catalyst, in the amount of 0 to 20 parts by weight;
- (F) carbonization auxiliaries, in the amount of 0 to 50 parts by weight;

(G) surfactant, 0 to 20 parts by weight;

(H) compound with an active hydrogen that will react with a polyisocyanate, in the

amount of 0 to 100 parts by weight;

Component A consisting of:

(I) polyisocyanate, selected from the group consisting of 4,4 diphenylmethane diisocyanate,

2,4 diphenylmethane diisocyanate and mixtures thereof, in the amount of 50 to 400

parts by weight;

Component A and Component B are mixed and reacted.

10. (Currently amended) A flame retardant polyurethane composition produced by the process comprising of mixing and reacting the following components:

Component B consisting of

(A). urea and/or urea condensates, in the amount of 50 to 200 parts by weight;

(B) bio based compound selected from the group consisting of molasses, corn syrup, sugar and mixtures thereof.

(C) Water, in the amount of 0 to 200 parts by weight;

(D) blowing agent, in the amount of 0 to 50 parts by weight;

(E) urethane catalyst, in the amount of 0 to 20 parts by weight;

(F) carbonization auxiliaries, in the amount of 0 to 50 parts by weight;

(G) surfactant, 0 to 20 parts by weight;

(H) compound with an active hydrogen that will react with a polyisocyanate, in the amount of 0 to 100 parts by weight;

Component A consisting of:

(I) polyisocyanate, selected from the group consisting of 4,4 diphenylmethane

diisocyanate, 2,4 diphenylmethane diisocyanate and mixtures thereof, in the amount of

50 to 400 parts by weight;

Component A and Component B are mixed and reacted.

11. (Currently amended) The flame retardant urethane composition of Claim ~~4~~ 18 wherein the polyisocyanate is polymeric diphenylmethane diisocyanate. ~~selected from the group consisting of 4,4 phenylmethane 2diisocyanate, 2,4 diphenylmethane diisocyanate, and mixtures thereof.~~
12. (Currently amended) The flame retardant composition of Claim ~~4~~ 8 wherein the carbonization auxiliaries is a phosphorus containing compound.
13. (Currently amended) The flame retardant composition of Claim ~~9~~ 12 wherein the phosphorus containing compound is an organic phosphorus containing compound.
14. (Currently amended) The flame retardant urethane composition of Claim ~~4~~ 9 wherein the urea condensate is selected from a group consisting of biuret, cyanuric acid, cyanmelide, ammelide and mixtures of urea, biuret, ammelide and cyanuric acid.
15. (Original) The flame retardant composition of Claim 13 wherein the organic phosphorus compound is dimethyl methyl phosphonate.
16. (Cancel) A method for producing flame retardant urethane compositions consisting of mixing and reacting the following components;

Component B;

- (A). urea and/or urea condensate, in the amount of 50 to 200 parts by weight;
- (B). bio based compound selected from the group consisting of vegetable oils, molasses, corn syrup, sugar, lignin, sodium lignin sulfonate, sodium cellulose, hemi-cellulose and mixtures thereof in the amount of 50 to 200 parts by weight,
- (C). water, in the amount of 0 to 200 parts by weight;

- (D) blowing agent, in the amount of 0 to 50 parts by weight;
- (E) urethane catalyst, in the amount of 0 to 20 parts by weight;
- (F) carbonization auxiliaries; 0 to 50 parts by weight;
- (H) surfactant, 0 to 20 parts by weight;
- (I) compound with an active hydrogen that will react with a polyisocyanate, in the amount of 0 to 100 parts by weight;

Component A;

- (J) polyisocyanate, in the amount of 50 to 400 parts by weight;

Component A and Component B are mixed and reacted.

- 17. (Cancel) The method of Claim 16 wherein the urea condensate is a mixture of urea, biuret, cyanuric and ammeline.
- 18. (Currently amended) – The method of Claim 16 wherein the bio based compound is selected from the group consisting of vegetable oil, molasses, corn syrup, sugar and mixtures thereof.—

A method for producing flame retardant urethane compositions

consisting of mixing and reacting the following components;

Component B:

(A) urea and/or urea condensate, in the amount of 50 to 200 parts by weight;

(B) bio based compound selected from the group consisting of vegetable oils

molasses, corn syrup, sugar, lignin, sodium lignin sulfonate, sodium cellulose,

hemi-cellulose and mixtures thereof in the amount of 50 to 200 parts by weight,

(C) water, in the amount of 0 to 200 parts by weight;

(D) blowing agent, in the amount of 0 to 50 parts by weight;

(E) urethane catalyst, in the amount of 0 to 20 parts by weight;

(F) carbonization auxiliaries; 0 to 50 parts by weight;

(G) surfactant, 0 to 20 parts by weight;

(H) compound with an active hydrogen that will react with a polyisocyanate, in the

amount of 0 to 100 parts by weight;

Component A:

(I) polyisocyanate, selected from the group consisting of 4,4 diphenylmethane

diisocyanate, 2,4 diphenylmethane diisocyanate and mixtures thereof, in the

amount of 50 to 400 parts by weight;

Component A and Component B are mixed and reacted.

19. (Cancel) The method of Claim 16 wherein urea and/or urea condensate, bio based compound, water, blowing agent, urethane catalyst, carbonization auxiliaries, non-reactive filler, surfactant, compound with an active hydrogen that will react with a polyisocyanate are mixed then mixed and reacted with polyisocyanate selected from the group consisting of 4,4 diphenylmethane diisocyanate, 2,4 diphenylmethane diisocyanate and mixtures thereof.
20. (Cancel) A flame retardant polyurethane composition produced from reacting a polyurethane forming composition which comprises (A) a polyisocyanate and (B) a mixture of bio based compound selected from the group consisting of vegetable oil, molasses, corn syrup, sugar and mixture thereof, and urea and/or urea condensate, urethane catalyst, surfactant and water.